CLAIMS

1.   An information-detecting apparatus comprising:

a receiving unit operable to receive digital data that includes several pieces of

5   element data, in which a change amount is imparted to a value of each of first element

data and second element data among the several pieces of element data, thereby

embedding additional information into both of the first element data and the second

element data;

a first selecting unit operable to select, as target data, a data set that includes

10   the first element data and the second element data;

a second selecting unit operable to select, as neighboring data, element data in

proximity to each of the first element data and the second element data;

a calculating unit operable to calculate, based on both of the target data and the

neighboring data, the change amount imparted to each of the first element data and the

15   second element data; and

a detecting unit operable to detect the additional information in accordance

with the change amount.

2.   An information-detecting apparatus as defined in claim 1, wherein when

the digital data is image data, each of the first element data and the second element data

20   comprises one of a piece of pixel data and several pieces of pixel data.

3.   An information-detecting apparatus as defined in claim 1, wherein the

additional information comprises a digital watermark.

4.   An information-detecting apparatus as defined in claim 1, wherein said

calculating unit calculates, as a first difference value, a value of a difference in data

25   value between the first element data and the element data in proximity to the first

element data, wherein said calculating unit calculates, as a second difference value, a

value of a difference in data value between the second element data and the element

data in proximity to the second element data, and wherein said calculating unit calculates, as the change amount, a value of a difference between the first difference value and the second difference value.

5.   An information-detecting apparatus as defined in claim 1, wherein said detecting unit compares the change amount with a predetermined threshold, thereby detecting the additional information.

6.   An information-detecting apparatus as defined in claim 1, wherein said second selecting units selects, as the neighboring data, element data falling within a range of eight pieces of element data centered at one of the first element data and the second element data in positive and negative directions of each of orthogonal X and Y axes.

7.   An information-detecting apparatus as defined in claim 1, wherein the second selecting unit selects, as the neighboring data, element data adjacent to each of the first element data and the second element data.

8.   An information-detecting apparatus as defined in claim 1, wherein assuming that the additional information is multi-bit information, and that each piece of bit information included in the additional information is embedded, for each piece of one-bit information, in each of a plurality of the data sets,

said first selecting unit selects the plurality of the data sets as the target data,

said second selecting unit selects the neighboring data for each of the plurality of the data sets,

said calculating unit calculates the change amount for each of the plurality of the data sets, and

said detecting unit determines a value of each piece of the bit information in accordance with the change amount for each of the plurality of the data sets, thereby detecting the additional information.

9.   An information-detecting apparatus as defined in claim 8, wherein

assuming that the additional information is multi-bit information, and that a piece of bit information included in the additional information is embedded in a plurality of the data sets,

said calculating unit calculates the change amount for each of the plurality of the data sets in which the piece of bit information is embedded, thereby calculating a sum of the calculated change amounts, and

said detecting unit determines a value of the piece of bit information in accordance with the sum of the change amounts, thereby detecting the additional information.

10. An information-detecting apparatus as defined in claim 9, wherein assuming a first threshold and a second threshold smaller than the first threshold,

said calculating unit eliminates, from being used to calculate the sum of the change amounts, the change amount equal to or greater than the first threshold or equal to or smaller than the second threshold among the change amounts for the plurality of the data sets in which the piece of bit information is embedded.

11. An information-detecting method comprising:

receiving digital data that includes several pieces of element data, in which a change amount is imparted to a value of each of first element data and second element data among the several pieces of element data, thereby embedding additional information into both of the first element data and the second element data;

selecting, as target data, a data set that includes the first element data and the second element data;

selecting, as neighboring data, element data in proximity to each of the first element data and the second element data;

calculating, based on both of the target data and the neighboring data, the change amount imparted to each of the first element data and the second element data; and

detecting the additional information in accordance with the change amount.

12. An information-detecting method as defined in claim 11, wherein when the digital data is image data, each of the first element data and the second element data comprises one of a piece of pixel data and several pieces of pixel data.

13. An information-detecting method as defined in claim 11, wherein said calculating the change amount comprises calculating, as a first difference value, a value of a difference in data value between the first element data and the element data in proximity to the first element data, and calculating, as a second difference value, a value of a difference in data value between the second element data and the element data in proximity to the second element data, whereby a value of a difference between the first difference value and the second difference value is calculated as the change amount.

14. An information-detecting method as defined in claim 11, wherein said detecting the additional information comprises comparing the change amount with a predetermined threshold, thereby detecting the additional information.

15. An information-detecting method as defined in claim 11, wherein said selecting the element data as the neighboring data comprises selecting, as the neighboring data, element data falling within a range of eight pieces of element data centered at one of the first element data and the second element data in positive and negative directions of each of orthogonal X and Y axes.

16. An information-detecting method as defined in claim 11, wherein assuming that the additional information is multi-bit information, and that each piece of bit information included in the additional information is embedded, for each piece of one-bit information, in each of a plurality of the data sets,

said selecting the data set as the target data comprises selecting the plurality of the data sets as the target data,

said selecting the element data as the neighboring data comprises selecting the neighboring data for each of the plurality of the data sets,

said calculating the change amount comprises calculating the change amount for each of the plurality of the data sets, and

said detecting the additional information comprises determining a value of each piece of the bit information in accordance with the change amount for each of the plurality of the data sets, thereby detecting the additional information.

17. An information-detecting method as defined in claim 16, wherein assuming that the additional information is multi-bit information and that a piece of bit information included in the additional information is embedded in a plurality of the data sets,

said calculating the change amount comprises calculating the change amount for each of the plurality of the data sets in which the piece of bit information is embedded, thereby calculating a sum of the calculated change amounts, and

said detecting the additional information comprises determining a value of the piece of bit information in accordance with the sum of the change amounts, thereby detecting the additional information.

18. An information-detecting method as defined in claim 17, wherein assuming a first threshold and a second threshold smaller than the first threshold, said calculating the change amount comprises eliminating, from being used to calculate the sum of the change amounts, the change amount equal to or greater than the first threshold or equal to or smaller than the second threshold among the change amounts for the plurality of the data sets in which the piece of bit information is embedded.

19. A recording medium operable to store computer program data comprising:

receiving digital data that includes several pieces of element data, in which a change amount is imparted to a value of each of first element data and second element data among the several pieces of element data, thereby embedding additional information into both of the first element data and the second element data;

selecting, as target data, a data set that includes the first element data and the second element data;

selecting, as neighboring data, element data in proximity to each of the first element data and the second element data;

5   calculating, based on both of the target data and the neighboring data, the change amount imparted to each of the first element data and the second element data; and

detecting the additional information in accordance with the change amount.